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**AVIATION MEDICINE TRANSLATIONS: ANNOTATED
BIBLIOGRAPHY OF RECENTLY TRANSLATED
MATERIAL. IX.**

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April 1976

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Federal Aviation Administration, Office of Aviation Medicine, Civil Aeromedical Institute, Oklahoma City, Oklahoma. **AVIATION MEDICINE TRANSLATIONS: ANNOTATED BIBLIOGRAPHY OF RECENTLY TRANSLATED MATERIAL.** IX. by Gregory N. Constant, E. Jean Grimm, D. R. Goulden, and LaNelle E. Murecko, April 1976 6 pp. Report No. FAA-AM-76-4.

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Translations
Cardiology
Vestibular
Function
Stress
Vision

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AVIATION MEDICINE TRANSLATIONS: ANNOTATED BIBLIOGRAPHY OF RECENTLY TRANSLATED MATERIAL. IX.

Asmus, E., and H. Garschagen.

Über die Verwendung der Barbitursäure für die photometrische Bestimmung von Cyanid und Rhodanid. (On the use of barbituric acid in the photometric determination of cyanide and thiocyanate.) *Zeitschrift für analytische Chemie* (Wiesbaden), 138:414-422, 1953.

The text begins with a brief review of recent studies on detecting cyanide and thiocyanate through optical methods. Because of present methods and lack of selectivity, determining the presence of cyanide and thiocyanate in aqueous solutions can be difficult.

A photometric cyanide and thiocyanate determination method in water, based on the Zincke-Koenig reaction, is described. Instead of a primary aromatic amine, however, barbituric acid is used to obtain polymethyne dye. Analytical methods, reagents, measurement range, and equipment used in the procedure are discussed, as are the effects of pH dependence, temperature, and other solutes on the reaction.

Under the conditions listed, cyanide contents in the range from 1 $\mu\text{g/l}$ to 1 mg/l and thiocyanate contents in the range from 1 $\mu\text{g/l}$ to 2.5 mg/l can be determined by using a Leitz compensating photometer or a Zeiss-Opton "Elko II" photometer in aqueous solutions of pH 2-10.

Azuma, M., and C. Umezono.

拡大高速記録心電図について
— 主として高域遮断周
波数の影響について —

(High-speed magnified cardiography (with special reference to the influence of high-cut frequency on the P-wave).) *Bulletin of the Chest Disease Research Institute* (Kyoto), 6:122-125, 1973.

The authors discuss high-speed magnified cardiography and the influence of high-cut fre-

quency on the P-wave by means of an expanded high-speed (100 mm/s) recording of modified electrocardiograms. A history of various noises that plague this technique is reported along with testing techniques, data, and results.

Basic results were that the measurements of the P-wave and the T-a wave of a cardiogram are greatly facilitated when working at 16 times the standard sensitivity with a recording speed of 100 mm/s. It was also preferable to work at a high region cutoff frequency (60-90 Hz) to observe fine changes in the P-wave.

The authors believe that although this technique is quite useful, countermeasures against various noises are not yet at a satisfactory stage. The authors are presently investigating the use of collages as electrode material in an effort to minimize the noise from electrodes.

Blanc, C. J., R. Digo, and P. Moroni.

Psicopatologia de la azafata. (Psychopathology of the airline stewardess.) *Revista de psicología general y aplicada* (Madrid), 25:353-358, 1970.

This general study of the psychopathologies of airline stewardesses was based on 300 psychological or psychiatric records collected from 151 stewardesses of a French airline over a 5-year period. The article discusses the difficulties of etiological interpretations and patterns of their assessment together with results that were more readily defined. Statistical analyses were conducted from histograms in which psychopathological structures and etiological factors were separated and determined for each patient.

The authors listed six major factors that appeared most frequently on the histograms: (1) a large number of neurotic and depressive symptoms (80 percent of the total psychiatric pathologies of the stewardesses); (2) a significant number of conflicting elements, not directly associated with occupational activity, in the private

lives of stewardesses (60 percent of examined stewardesses); (3) few acute psychotic conditions (3 percent); (4) more frequent occupational conflicts, such as lack of motivation for work or maladjustment toward work, in stewardesses who had been working 5 years or longer (20 percent); (5) the etiological role of fatigue and occupational duties affecting those stewardesses suffering from conflicts in their private lives; and (6) a limited etiological impact of somatic diseases (5 to 10 percent).

The authors concluded that, on the psychopathological level, the data distinguish stewardesses from other groups of flight personnel. Stewardesses are more affected by depressive and neurotic disorders, have relatively acute emotional reactions of conflictive origin, and are the most vulnerable and sensitive to job demands.

Borredon, P., and J. Nathie.

Réactions physiologiques de sujets humains exposés à des infra-sons. (Physiological reactions of human subjects exposed to infrasonic vibrations.) *Revue de Médecine Aéronautique et Spatiale* (Paris), 46:276-279, 1973.

This study concerns 42 men (aged 19-27) exposed to 50 min of sinusoidal infrasonic variations in atmospheric pressure (fundamental: a frequency of 7.5 Hz at a level of 130 dB) accompanied by a parasitic sonic spectrum. Subjects were studied for physiological effects. Four variables chosen for measurements of the effects of treatment were reaction time in response to a light signal, heart rate, maximum arterial pressure, and minimum arterial pressure.

Stimuli were applied at three levels: infrasonic stimulation, noise stimulation, and silence (within environmental conditions). Comparisons of three averages corresponding to each of the three levels of treatment were made as follows: (1) infrasonic/noise comparison; (2) noise/silence comparison; and (3) infrasonic/silence comparison. Eight measurements of arterial pressure taken included two premeasurements and six measurements during the course of the experiment.

A significant increase (at the 0.05 level) in diastolic pressure was obtained by comparing the mean of minimum arterial pressure under silence (61.9 mm Hg) and the mean under infrasonic treatment (63.2 mm Hg). A bibliography is included.

Bremond, J.

Recueil par questionnaire des données du comportement dans une perspective ergonomique. (Behavioral data collection by questionnaire in a human engineering perspective.) *Revue de Médecine Aéronautique et Spatiale* (Paris), 47:493-498, 1973.

This article concerns the collection of behavioral data by the use of a questionnaire on human engineering problems. Three major topics are discussed within the report: (1) use of questionnaires as a method of data acquisition in human engineering; (2) different forms of questionnaires; and (3) four examples of questionnaire usage.

The forms of questionnaires discussed are the standardized interview, the collection of critical incidents, rating scales, and the opinion questionnaire. Applications of these forms are described in aviation contexts, which include a study of duty stations in the French System of Air Defense Information Processing, a study on the pilot's workload, annoyance resulting from airport noise, and evaluation of the feeling of fatigue.

Cabezas, P. G.

Nuestra experiencia de estatuquinesimetria en pilotos de aviacion. (Our experience with statokinesimetry in pilots.) *Agresologia* (Paris), 13:35-41, 1972.

A standard statokinesimetry test was given to 2,000 pilots and 1,000 trainees at the Center for Research in Aviation Medicine. The study was conducted to devise a method of selecting and testing military and civilian pilots with respect to psychophysiological anomalies in the field of otolaryngology.

A standard half-minute test (threshold I) was administered first in the light, then in the dark, and then once more in the dark with subjects holding their arms in an extended position. Subjects were placed in the following categories: (1) 700 pilot trainees; (2) 600 pilots with 1,000 to 5,000 hours of flight time; (3) 400 pilots with 5,000 to 30,000 hours of flight time; (4) 300 stewardess applicants; (5) 300 stewardesses with more than 1,000 hours of flight time; (6) 300 male flight attendants with more than 2,000 hours of flight time; and (7) 350 active flying personnel without reference to total flight time.

Data were reported in graphic form with respect to localization (posterior, anterior) of the slow component of the body response as well as to laterality (left, right). In cases in which there was an observed increase in the area of the slow component, or in which more than 35 displacements (in one-half minute) of the rapid component were observed, the subjects were given a complete vestibular examination and study (roughly 1 percent of all subjects). These further tests included pointing, walking, and electro-nystagmography together with acceleratory, deceleratory, and caloric stimuli. The results of these tests were not presented in the text.

From the data of the statokinesimetry tests, the author concluded: (1) the projection of the center of gravity was predominately to the rear and to the left in all groups; (2) the ratio of forward-backward movements to left-right movements was approximately 3:1 for men and 2:1 for women; (3) the average number of movements was greater in men; and (4) the average number of displacements in dark was approximately double the number obtained in light.

Fokkema, S. D.

La motivación y las otras variables de personalidad en el piloto. (Motivation and the other variables in the personality of the pilot.) *Revista de psicología general y aplicada* (Madrid) 25:261-275, 1970.

This article discusses motivation and psychophysiological variables in the selection of pilots. It also presents: (1) a concept of motivation as it relates to psychodiagnostic agents used in selecting pilots; (2) a distinction between motivation as a disposition and an interpersonal variable as opposed to motivation as a current state (determined by the external environment) and intrapersonal values; and (3) variants related to anxiety and their effect on "weak personalities" (extroverts) as opposed to "strong personalities" (introverts).

Topics discussed at length include effectiveness of various personality tests (Taylor anxiety scale, Illinois Personality Judgment Test) as well as the use of psychophysiological tests (GSR, EEG, and vasoconstriction detection for anxiety) in determining motivation and other factors in the personalities of pilots.

The author concludes that it is not yet possible to use psychophysiological variables in selecting pilots and states that, on the basis of present day evidence, personalities best suited for the pilot occupation have an average-to-moderate activation, a strong nervous system, and an anxiety level that is moderate at most.

Hoffelt, W.

Flugstress, eine messbare Grösse? (Flight stress: a measurable magnitude.) *Wehrmedizinische Monatsschrift* (Munich), 17:263-266, 1973.

This is a general article on the difficulties involved in measuring flight stress on both an intraindividual and an extraindividual basis. The article includes a discussion of the relative merits and disadvantages of in-flight studies versus laboratory studies.

Because stress is not a static force but one that is difficult to measure, the author believes science is still far removed from the interindividually valid statements with which he feels stress studies are concerned in the final analysis. The author concludes that, for the time being, applied research has only three basic forms of stress measurement: quantification of physical environmental stressors, psychological activity analysis at the work place, and standardized interviews.

Kuerschner, D.

Augenfunktion und die Beleuchtung der Instrumentenanzeigen im Flugzeug. (Eye function and the illumination of instrument dials in aircraft.) *Wehrmedizinische Monatsschrift* (Munich), 17:281-283, 1973.

This article discusses physiological function of the eye in relation to illumination of instrument dials in aircraft. It compares and reviews various illumination studies done in Germany and the United States from 1940 to the present time. The article discusses the effectiveness of red light (wavelengths above 610 nanometers) and white light or blue-filtered white light and points out the advantages and disadvantages of these various illumination methods.

The author believes that many optical-physiological problems of illumination may be solved through compromise and are somewhat dependent on whether operation of the respective aircraft model requires optimal night vision of the crew. A bibliography is included.

Lehwess-Litzmann, I.

Lageillusionen und optische Täuschungen. (Illusions of location and optical illusions.) *Technisch-ökonomische Informationen der zivilen Luftfahrt* (Berlin-Schönefeld), 9:278-281, 1973.

This is a general review of research done in the fields of illusions of location, optical illusions produced by ocular nystagmus due to various forms of acceleration, and optical distortions caused by various adverse conditions (e.g., darkness, inclement weather, etc.). The author includes studies conducted under laboratory conditions and under actual flight conditions and suggests that indoctrination regarding such illusions should be included in the training program of aircraft pilots. A bibliography is included.

Lehwess-Litzmann, I.

Leistung und Zeitzoneflüge. (Performance and inter-time-zone flight.) *Technisch-ökonomische Informationen der zivilen Luftfahrt* (Berlin-Schönefeld), 10:50-54, 1974.

This article contains a review of the literature of aircraft crew performance with respect to inter-time-zone flight, including both longitudinal and latitudinal changes. The body of the article is a study relating published guidelines of the International Civil Aviation Organization (ICAO) for necessary crew rest periods and actual conditions prevailing in long-distance flights. Data were subjective feelings obtained by means of a rating scale that included measures of duration of sleep in hours (including type of sleep) during flight days and during 3 rest days that followed.

The study concluded that the guidelines of the ICAO are supported by data from the subjective rating scale. The author feels it is necessary to establish medical requirements associated with flights involving time shifts.

Maciejczyk, J.

Stress jako przyczyna zaburzen emocjonalnych pilotow. (Stress as a cause of emotional disturbances in pilots.) *Przegląd psychologiczny* (Warszawa), 17:89-103, 1969.

This study of the causes of emotional disturbances as an impact of stress in airline pilots is limited primarily to the extent that traumatic factors may be considered a cause of emotional

disturbances. Included is a motivational study of pilots in regard to in-flight service and military service.

The author concludes that one of the causes of emotional disturbances is the quantity of stress experiences—the greater the number of experiences, the greater the probability of emotional disturbances. Pilots with emotional disturbances had more stress experiences caused by pilot error, improper orientation of flight equipment, and poor physical equipment. Results of the motivation portion of the study showed that pilots affected by emotional disturbances display lower motivation for flight service and military service.

Magdalena, F. M.

Los cambios de postura en los accidentes aereos. (Postural changes in air accidents.) *Agressologie* (Paris), 13:49-59, 1972.

Postural, directional, temporal, and spatial disturbances that cause air crashes or disasters were reviewed. Vestibular disturbances, Coriolis vertigo after angular acceleration, false sensations following linear acceleration, and postural illusions were also discussed.

Two case studies are presented. In one, the cause of the accident was determined to be a Coriolis reaction; the second was a case of false "inverted" flight, a typical oculogravic illusion.

The text includes a table in which the author has schematized all flight situations that can lead to disorientation of a pilot.

Nainys, I. V.

Идентификация личности
по проксимальным костям конечностей

(*Identification of persons according to the proximal bones of the extremities.*) Vilnius, 1972, 158 pp.

This book deals with the identification of individuals by means of the proximal bones of the extremities in work associated with medicolegal osteology and some juridical disciplines, primarily that of criminology. The aim was to provide scientifically grounded criteria for determining age, sex, stature, and some specific characteristics of an individual according to the humerus and femur. The history of the problem and the

methods used in studying 253 cadavers are presented in detail. Discussion of results covers the morphological criteria of bones, age changes of the femoral and humeral bones, identification of individuals by means of the humeral and femoral bones, and problems of osteological expertise (including forensic-osteological expertise, identification of a person after exhumation from mass graves, and victims of aviation injury). The text also contained a detailed bibliography.

Riscutia, R., G. Kurth, and E. May.

Photostereotomie—ein neues Verfahren zur Ähnlichkeitsdiagnose an Schädeln wie Skeletteilen. Sind die beiden spätbronzezeitlichen Kinder von Runstedt enger verwandt? (Photostereotomy, a new method for similarity diagnosis of skulls and skeletal parts. Are the two late-bronze-age Runstedt children closely related?) *Zeitschrift für Morphologie und Anthropologie* (Stuttgart), 65:55-69, 1973.

Two skulls of children about the same age, found in two late-bronze-age midden pits in the Treue coal workings, Runstedt, Germany, were photostereotomically checked for similarities, for multiplicity of identities, and, primarily, for the similarity of specific traits. The same methods and traits as those used in paternity assessments or in studies of twins were used in making the diagnosis. Similarity of form of the two skulls was confirmed by three-dimensional measures plotted on grid lines and was further emphasized by unidirectional asymmetries in both skulls. Grounds for a working hypothesis of "close kinship" include the special *in situ* conditions; the slight probability that according to the statistical distribution of mortality, two children of the same age would have been "buried" practically simultaneously instead of being cremated; and the higher-than-average similarity between the skulls. An assumption that these skulls represent (enzygotic) "twins" could be validly tested and confirmed or rejected only if there were authentic enzygotic twin skeletons available for study and comparison. The article also reviews the history of the two skulls and the work done previously by older methods.

Sivadon, P., and A. Fernandez.

Les troubles psychopathologiques en milieu de travail nucléaire. (Psychopathological disorders in nuclear work environment.) *Annales médico-psychologiques* (Paris), 2:201-213, 1968.

Approximately 536 employees were observed for psychopathological manifestations that might exist in various nuclear work environments. The study is based on psychological tests, specific questionnaires, and clinical observation. Among the tests used by the authors were efficiency tests (Wechsler-Bellevue and Cattell), projection tests (Rorschach, Rosenzweig, Holtzman, and Thematic Apperception Test), and specific questionnaires (Cornell-Index and Berger).

Using clinical observations and test data, the authors constructed the basic personality pattern of the nuclear worker. Personality type includes effects on behavior in the working environment and manifestations of the work on the personal life of the workers. The most common clinical observations were psychosomatic illnesses, neurotic disorders and neuroses, and pathological personalities. Several major reactive states and cases of radiation exposure were investigated.

The authors report no real difference between observed behavior in the nuclear environment and that in other types of work situations. In no case were traits observed that could classify the worker as mentally ill. The authors did find, however, emotional disorders, minor neurotic manifestations, psychosomatic disorders, and several cases of intellectual deficiencies caused by alcoholism. Finally, the authors draw attention to a few anomalies linked more directly to the nuclear work environment, especially those syndromes related to the fear of irradiation and psychosomatic syndromes linked with former or recent situations of radioactive risk.

Strumza, M. V.

Effets somatiques des bruits. (Somatic effects of noises.) *Sciences* (Paris), 12:58-63, 1972.

This general article on the somatic effects of noises consists of two parts—the properties of sonic vibrations and the organic effects of noises.

Included in the discussion of the properties of sonic vibrations are a definition of sound as it is applied to physiological data (i.e., pitch, timbre, loudness); a definition of audible frequencies; perception of energy as received by the organism; conversion and diffusion of acoustical energy; and mechanisms that attenuate perceptions.

The section on organic effects of noises includes a discussion on the interaction of noise with the respiratory system, circulatory system, blood, digestive system, vegetative nervous sys-

tem, endocrine glands, and various reactional phenomena (sleep study data, reflexes, and related arthritic conditions).

Tomilin, V. V., and B. M. Pikovskiy.

**СУДЕБНО-МЕДИЦИНСКАЯ ЭКСПЕРТИЗА
ПРИ ЛЕТНЫХ ПРОИСШЕСТВИЯХ**

(Forensic medical expert testimony in airplane crashes.) *Sudebno-Meditsinskaya Ekspertiza* (Moskva), 17:7-12, 1974.

This paper presents the difficulties forensic medical experts face when investigating an aircraft accident. Areas discussed are forensic medicine criminology, biochemistry, and histochemistry.

It has been found that the most suitable methods of detection were direct detection work on the wreckage, analyzing the oral reactions of crew and incidental noises arising at the time of the accident, and experimentally modeling emergency situations. An overview of each of these methods and their effectiveness is presented.

Biochemical and histochemical methods were found to be less suitable because of complications in procedures and the fact that they can be used only when direct information indicates there were no wounds, blood loss, oxygen starvation, etc., that would negate the findings of chemical analysis.

It was concluded that biochemical and histochemical examination and testimony should be reviewed in terms of the features of the specific case and should play a supplementary role to other methods of investigation.

Uematsu, H., and H. Mori.

折りたたみ方式高速フーリエ変換による心電図の特徴抽出とその波形認識への応用について

(Characteristics extraction and pattern recognition of electrocardiograms using fast Fourier transforms in the folding mode.) *Japanese Journal of Medical Electronics and Biological Engineering* (Tokyo), 11:78-85, 1973.

This paper develops the folding-mode, fast Fourier transform method that is designed to effect high-speed Fourier transforms by a different mode. The invariant $(\sqrt{A_n^2 + B_n^2})$ Fourier component of the electrocardiogram wave obtained was used to construct a characteristic space, and the threshold logic unit (TLU)

was used to differentiate between three groups: normal, myocardial infarction, and atrial septal defect. The study includes the method of recording cardiograms as well as a detailed description of the computer program (ALGOL).

The authors made 100-percent-correct discrimination between the three groups (normal, myocardial infarction, and atrial septal defect) even with a low sampling point number of 100 and a dimensional number of 12. These results are integrated to indicate the great potential of low frequency wave components in electrocardiogram diagnosis.

Vettes, B., J. Demange, and R. Auffret.

Mesure de la dégradation de la performance humaine sous l'influence d'une hypoxie chronique. (Measurement of human performance deterioration under the influence of chronic hypoxia.) In: *International Congress on Aviation and Space Medicine, 21st, Munich, West Germany, September 17-21, 1973, Preprints of Lecture* (Munich), 1973.

The effects of hypoxia were studied under laboratory conditions by means of a primary compensated visual pursuit task and an associated secondary task, also visual (dealing with reaction time). Hypoxia was established by means of a low-pressure chamber simulating an altitude of 5,000 m.

Four subjects participated in four trials each during an experiment that comprised the following features: (1) 10-min tracking task; (2) fast reduction of pressure in the altitude chamber followed by another 10-min tracking task; and (3) moderate intellectual work during a 40-min trial and a final 10-min tracking task.

Statistical analyses showed a significant difference with respect to complex task errors (tracking) between ground-level performance and after 50 min at a 5,000-m altitude. There was also a slight dispersion in reaction time.

The authors feel that the study helped to perfect a method associating two psychomotor tasks that are slightly sensitive to learning and are reproducible in time. They believe that additional studies by association of these two tasks will allow better differentiation between measurement of various types of hypoxia (different origins) and will permit more complete studies on protection against adverse effects (i.e., drugs, acclimatization).